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ABSTRACT

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Student Record Automating Using Desktop Computer Technologies

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Abstract

Teacher education programs nationwide are required by state and federal governments to maintain comprehensive student records of all current and graduated students in their programs. A private, mid-sized university established a faculty team to analyze record-keeping procedures to comply with these government requirements. The team's mandate was to establish an effective and efficient procedure for obtaining and handling student records. The lack of uniform standards in the record keeping process produced inconsistent and incomplete data. The then current data-keeping procedure was paper-based and inefficient. A database management system based on Microsoft Access was developed and implemented to capture, store and organize student data. Using the system, the education program developed and maintained electronic student files that provide the data needed for required reports. Additionally, the DBMS provides several other benefits to the university's education department.

Problem Statement

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Teacher education programs in the state of Florida are required to maintain comprehensive records of all current and graduated students in their programs. The department of education at the University of Tampa, comprised of 262 students, six full-time faculty, and one staff assistant, began the arduous task of locating, collecting and organizing student data necessary to comply. These state and federal reporting requirements are placing an enormous burden on department faculty and staff in terms of data location, retrieval, collection and analysis.

No comprehensive, organized system for student-data maintenance has ever been in place in the department. Communication of student data between personnel within the department was non-existent. The lack of uniform standards in the record keeping process produced sets of inconsistent files, which were frequently lost or incomplete. This resulted in inadequate reporting and in excess of 500 measured hours input by faculty and staff to comply in Spring 2000. The entire procedure was paper-based and totally inefficient. Considering the volume of the work needed to complete state and federal reports, the project was unmanageable within the framework of the existing system and technology. The ability to obtain and interpret information quickly and accurately was more important now than ever before. (NCATE, 2000) This realization led the department to seek alternative procedures.

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Background

An interdepartmental project team ("the team") was established to evaluate various alternative solutions to the problem. The team determined a technologically focused solution would be appropriate. One solution was to explore the creation of a database management system in which essential data could be available in an easily accessible form (Femea & Abdur-Rahman, 1999). Research and practical experience revealed "A greater number of education programs, as well as students, now have knowledge about and access to computer technology" (Shoaf, 1999, p.2). Since technology has become an integral part of life for educators and their students, the department realized it was time to infuse computer technology into its outdated record-keeping system. NCATE, the National Council for Accreditation of Teacher Education, advances three broad recommendations for technological infusion into education programs (NCATE, 2000):

1. Stimulate more effective uses of technology in the teacher-education program
2. Use technology to improve the existing processes
3. Improve and expand operations through greater uses of technology.

Utilizing resources internal to the university, an effort to develop a computerized record keeping system for education majors was initiated.

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Hypothesis

Underlying research and project development was undertaken pursuant to the following hypothesis:

> The implementation of a network desktop data base management system for maintaining students records in the Education Department will reduce the number of employee hours required to maintain and organize the students data base over the current paper base system and provide a uniform and organized format for student record keeping.

Measurements

Measurements of faculty and staff time inputs are based on accumulated individual estimates for the tasks performed related to data accumulation for government reporting. Measurements of faculty and staff time inputs after DBMS implementation are forecast estimates.

Rational for Implementation of a Database Management System

A database management system (DBMS) is a software program that allows the user to create a database, store the data, provide query language support, produce reports, and create data entry screen forms (Post, 1999). Data in many organizations are incomplete, fragmented, and lacking organization, making

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it difficult to access and use. The DBMS facilitates data entry and storage. It also allows for sophisticated data retrieval and analysis through the query procedures. The purpose of implementing a DBMS is to provide a comprehensive, computerized system for capturing, storing, retrieving and analyzing student data. Additionally, utilizing a DBMS in conjunction with the university's local area network (LAN) allows for communication and retrieval of the data throughout a given department.

Data to be Collected

The team met with the Education Department at large to determine what data needed to be collected and stored. It was determined that data from the following categories was necessary:

1. Demographic data (i.e. name, address, phone, age, class, graduation date, department major, etc.)
2. Academic data (i.e. courses taken, grades)
3. Tracking data (i.e. completion of pre-internship, portfolio completion)

Software Application Selection Considerations

The complexity of the data to be stored will influence the choice of software. Spreadsheet programs like Microsoft Excel or Lotus 123 are familiar to many users and contain database capabilities. These programs store data in two-

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dimensional, or flat, data sheets in the same manner, as documents are stored in a file cabinet. Your file cabinet contains drawers that contain files. In those files are folders that contain documents, all in a well-defined hierarchy. Similarly, a spreadsheet database stores student data in one file containing all necessary information. This necessitates significant redundancy in data storage. A more practical choice is a relational database like Microsoft Access. The relational database stores various types of data in tables (sometimes called relations). These tables are then linked, or related, by a common data element like a student's ID number. This data element, or field, is called the primary key field. When a primary key field is used in a related table, it is called a foreign key (ref. Figure 1). Stored data is of little value without a user-friendly way of retrieving data that meets user-established requirements. In relational databases, through query procedures, data stored in one table may be combined with data stored in other tables and retrieved. In a relational database, data normalization, the process of defining tables properly to minimize redundancy, and ensure data integrity (Post, 1999), eliminates the necessity for redundant data storage. This allows queries from multiple tables enabling very powerful data analysis. For example, using simple query procedures, students in the education department may be sorted by major, then class within major, then ethnicity within class, then grouped by grade point average. There is virtually no limit to the program's ability to categorically

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retrieve data. This feature is extremely useful for research and compiling information for government reports.

Microsoft Access is a powerful desktop computer DBMS and was chosen for this project. The single biggest difference between Access and Excel is that Access is a relational database, while Excel's database features are nonrelational (Blattner, 1999). Access has several features that make it preferable over other software programs. It is a powerful, relational DBMS designed for the desktop computer. It is capable of using data in numerous formats, allowing it to import data from many existing databases. It is capable of operating on various platforms (PC, Mac, etc.). It is easy to learn and, while Access has significant built in analysis tools, individuals unfamiliar with Access analytical procedures may export data from Access into a familiar standard statistical program like SPSS or SAS.

Database Design Considerations

The design of a database is dependent upon several factors. Of primary consideration are the entities, or subjects, for which the data is stored (e.g.- student, instructor, class), and the particular attributes, or characteristics of those subjects (e.g.-student number, name), being stored. After determining the desired entities and attributes, an entity-relationship diagram (ERD) is created (on paper) to depict how the tables will relate in operation. This diagram is useful when determining what attributes should be stored for the various entities and during

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actual database development in the DBMS. Figure 2 depicts an example of an ERD created in Microsoft Access.

Also of importance during database design are the source of the data to be input into the database and the method of data entry. "Data entry can be one of the most time-consuming aspects of developing and maintaining a computer database" (Femea & Abdur-Rahman, 1999, p.2). A significant number of the data attributes needed for this project were already stored in the university's mainframe database. By linking the Access database to files created from that system, the project database is able to utilize direct data importing (DDI), thereby significantly reducing the time required for data entry and maintenance. DDI also reduces data-entry errors, the single greatest source of errors in a database. (Rob, 2000).

Staff personnel must enter data that cannot be imported. To facilitate data entry, a data-entry form was designed for this purpose. The copy of the form displayed in Figure 3 shows the data-entry spaces (white boxes) where the user keys in the appropriate information for each student. In addition to facilitating data entry, this form is a useful working tool. It provides the user the complete data set for each individual on a single, easy to read screen.

Although various other factors influence database design, one final consideration that should be mentioned is the consideration of who will be entering and using the data. Since this database was designed to be used by

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numerous individuals, both accessibility and security issues arose during initial design and prototyping. Accessibility issues are easily resolvable by placing the data in centralized files on the network. Utilizing an icon placed on their computer desktops, users are able to double-click directly into the data. Data-security features built into Access help prevent unauthorized data access by requiring passwords. Users may be restricted to viewing data, authorized to enter but not edit data, enter and edit data but not modify the database, or full access through various levels of password security. However, the best password security features fail when unauthorized individuals obtain passwords. Consequently, users must be trained so they completely understand the importance of protecting the students right to privacy and confidentiality of student information. While accessibility to data and security of the data are conflicting goals, through proper database design and user training, both can be effectively and efficiently achieved.

Potential Applications of Data

Once the data base management system is developed and employed the myriad of purposes it can serve for the department are as follows:

1. The professional development of faculty and students is enhanced. Once faculty members become accustomed to using the technology, they can train students to do their own inquires. Additionally, by using technology

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to find, organize and interpret data, faculty may become more reflective and critical about information quality and sources (NCATE, 2000).

2. The education department could gain greater support from university administration. Teacher education programs are frequently given low priority for special technology funding. Perhaps with the development of a proto-type data-base management system funding for essential technology will be forthcoming (NCATE, 2000)
3. Technology can serve as a " catalyst for reconsidering the entire architecture of teacher education" (NCATE, 2000, p.8) (i.e. how, when and where students will acquire the skills and knowledge they will need).
4. The department can investigate whether scores on required state admission and licensure tests are predictors of students' academic success and success as a first year teacher, respectively, utilizing the analytical capabilities of the DBMS.
5. The findings could provide data for faculty to develop a student profile of successful students and students at-risk for academic failure (Femea, Abdur-Rahman, 1999)
6. Data analysis can assist the department in detecting trends in admission, attrition, progression and graduation of education students. (Femea, Abudur-Rahman, 1999)
7. The system can be used to assist faculty in student advising.

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Results

Preliminary results of DBMS design and implementation indicate that the system will achieve the desired results. Interviews with faculty and staff who have reviewed or used the system in its current form show approval for system design and usability. Users unanimously express their belief that using the DBMS to maintain student records will significantly reduce the time requirements for and accuracy of government reporting. However, it must be noted that this is an initial assessment. Full assessment of the system will require measurements over a one-year period to determine actual reductions. This is in progress.

Conclusion

The development of the database system is essential to the long-term survival of teacher preparation programs. Utilizing the DBMS, departments and colleges of education may develop and maintain electronic student files that provide data for state and federal reports. The DBMS will result in accurate, efficient reporting of student data and eliminate much of the paper work burden currently encountered in many teacher preparation programs. This supports the premise of our hypothesis.

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Opportunities for Future Research

Future research opportunities are two fold. The first opportunity relates to the uses of data. The second relates to expansion of the program to incorporate other activities within our university.

Uses of the data include:

1. Analysis of student data for curriculum development, modification, and reform.
2. A microanalysis of data to detect trends in student performance.
3. Comparing the numbers from our institution to teacher preparation programs in other institutions of higher learning.
4. Support efforts for consideration of masters program.

Expansion of program initiatives include:

1. Automating internal forms
2. Automating state and federal reporting
3. Expanding the system university-wide

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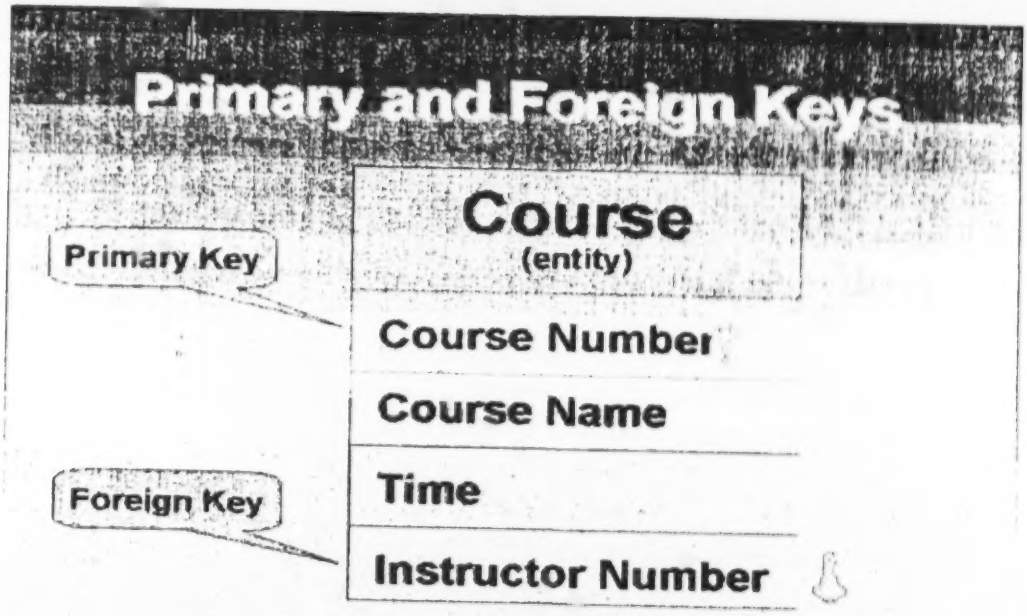

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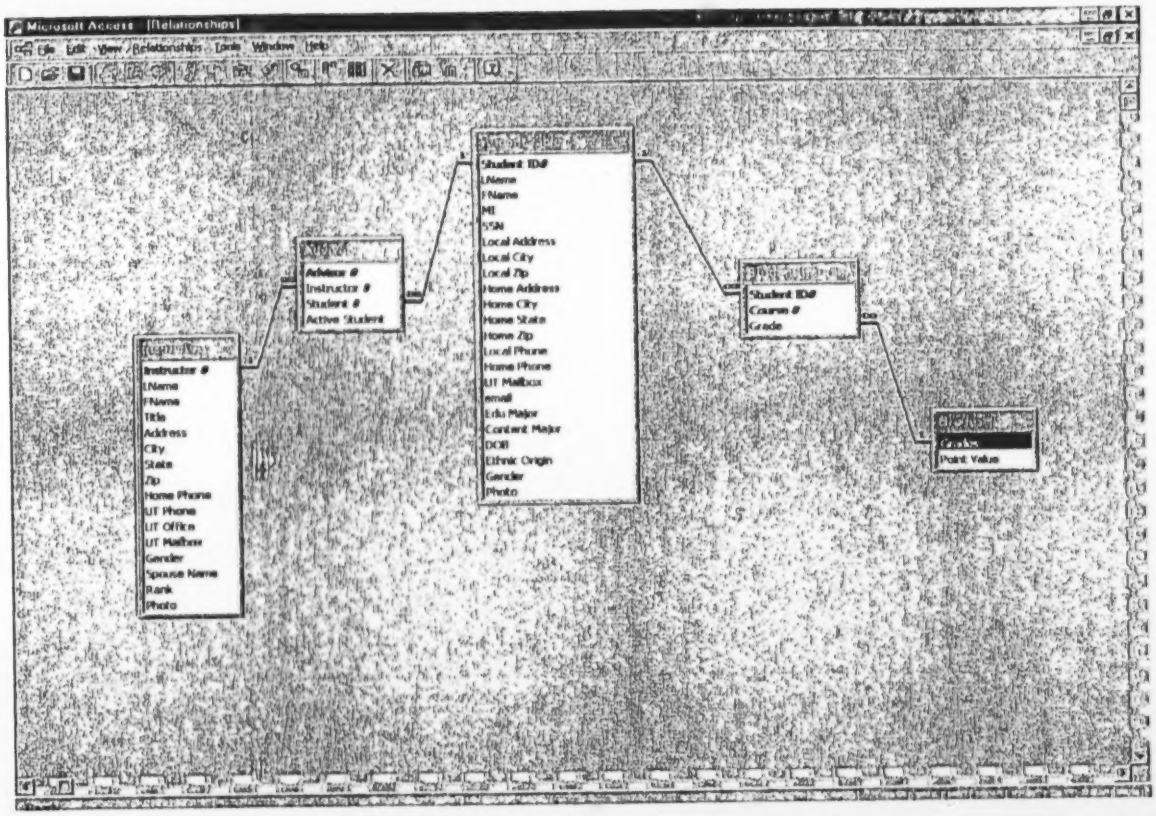

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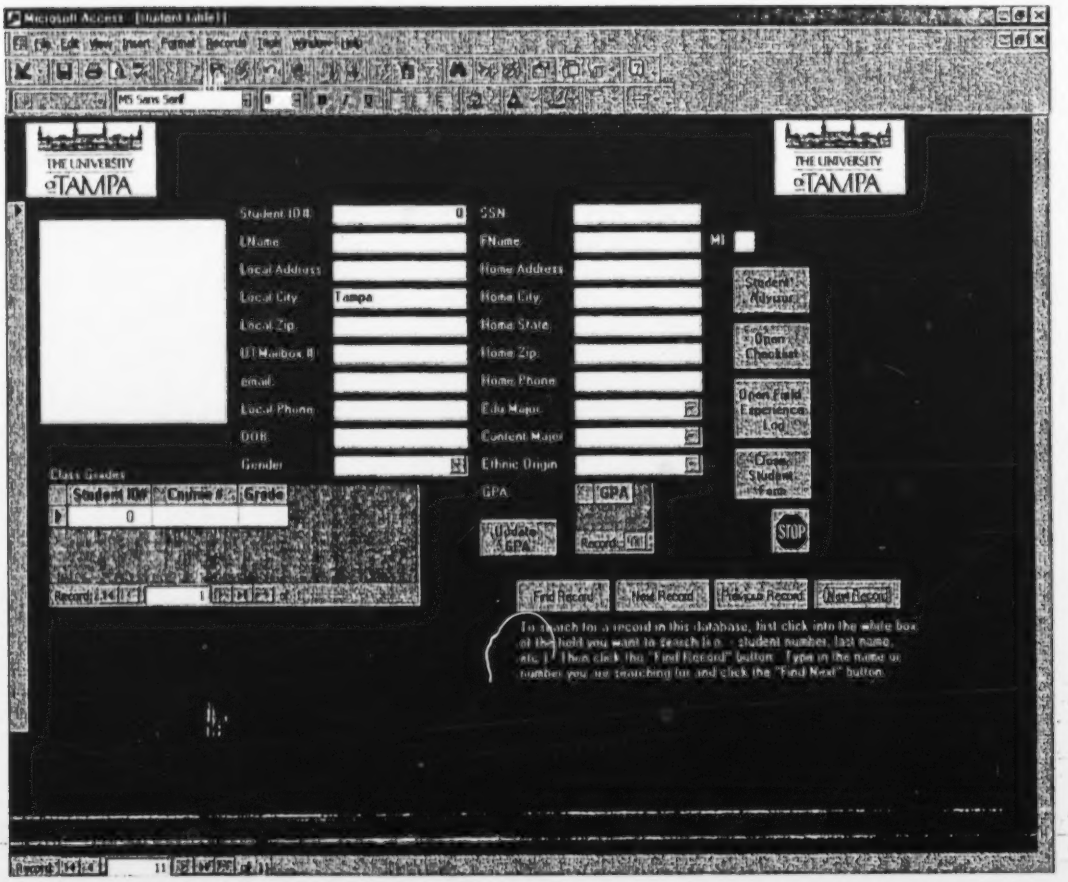

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